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The Choice Between Wired and Wireless

By Thomas Kidd - July-September 2009

Whether wireless voice, video or data, the number of wireless applications is increasing. Wireless capabilities can be as simple as a wireless doorbell system or as complex as a naval unmanned aerial system providing realtime intelligence to forward-deployed Marines and Sailors.

While the use of wireless systems is certainly advantageous for mobile requirements, wired systems retain a number of inherent benefits for non-mobile, transportable or nomadic requirements.

Both wired and wireless connectivity have advantages and disadvantages that should be evaluated whenever new capabilities are considered. "One Size Fits All" is not a solution for every Navy or Marine Corps requirement.

Wired and wireless solutions each possess inherent risks and benefits that should be considered whenever a transmission medium is selected. And while some risks and benefits are obvious, others are not immediately apparent until a thorough comparison of capabilities, benefits, risks and rewards is made.

Cost. Cost benefits associated with wired and wireless transmissions were often dramatically different a decade or more ago. A copper "wired" solution was generally less expensive than many wireless capabilities, while fiber optic and its associated equipment were generally more expensive than wireless systems.

However, these broad rules of thumb no longer apply. Recent technological developments and production capabilities have significantly reduced the cost of wireless and fiber optic equipment.

Determining the "best buy" for wired or wireless systems now requires consideration of installation requirements and associated costs, as well as maintenance requirements and technology refresh costs.

Accordingly, the total cost of ownership must be developed to determine the most economical transmission media to support connectivity requirements.

Security. Security risks must be an upfront driver for determining wired or wireless use. Security considerations include cryptographic requirements and information assurance (IA) requirements.

Additionally, physical security requirements, including access to transmission lines or transmission points, such as towers, antennas and associated equipment, must be considered.

Depending on the capability requirement, security issues may be complex. Wired and wireless transmission media have previously been chosen with little if any security considerations.

However, today's digital capabilities generally necessitate layered security measures to ensure networks and standalone systems are protected from physical, as well as internal and operational damage.

Potential information compromise must also be considered when addressing security issues. It may not be easy to determine the best alternative between wired and wireless due to unique security issues among voice, video and data transmissions.

Wireless operations are generally thought to have greater security concerns than wired operations due to radio propagation characteristics; however, both mediums are susceptible to intrusion if security issues are not adequately addressed.

Reliability. All Department of the Navy voice, video and data requirements include mandates for reliable solutions that minimize downtime. Downtime not only results in service loss to users but also increases maintenance and reinitiation activities.

A number of factors affect system reliability including environmental, electrical and maintenance issues, in addition to other considerations. Reliability, in many ways, is similar to system security;

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reliability can be impacted by issues that appear insignificant or are overlooked.

While wired systems may seem to offer the greatest reliability, they are subject to vulnerabilities that wireless systems are not. Some common issues that often impact the reliability of wired systems are severe weather conditions, which can destroy cables, or digging equipment and tracked vehicles, which can cut cables.

Wireless systems have intentional and unintentional radio frequency interference vulnerabilities as well as signal coverage challenges.

The Navy and Marine Corps will continue to use both wired and wireless systems for communications, intelligence and other naval requirements.

The choice between wired and wireless, given the option, is not an easy or obvious decision.

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